CLAIMS

Sub B' 1. A method for transmitting data from a radio network subsystem (RNS) to user equipment (UE) in a mobile telephone system, comprising:

- (606) the radio network subsystem (RNS) transmits a dedicated control channel to the user equipment (UE);

- (610) the radio network subsystem (RNS) transmits a dedicated traffic channel of variable data transmission rate to the user equipment (UE);

- (608, 612) during transmission, the radio network subsystem (RNS) spreads each channel with a spreading code;

- (602) the spreading code used to spread the traffic channel is changed according to the required data transmission rate,

characterized in that (604) each control channel frame indicates the spreading code with which the corresponding traffic channel frame is spread when transmitted.

2. A method as claimed in claim 1, **characterized** in that the control channel and traffic channel frames associated with each other are transmitted on the same frequency, spread with a different spreading code, and substantially simultaneously, i.e. separated by one frame length at most.

3. A method as claimed in claim 1, **characterized** in that the control channel frame comprises a transport format indicator in which the spreading code used to spread the traffic channel is disclosed.

4. A method as claimed in claim 1, **characterized** in that the spreading codes are arranged into a code tree in such a manner that on the first level, the code tree root comprises a one-bit spreading code, the second level comprises two branches with mutually orthogonal two-bit spreading codes, the third level comprises four branches with mutually orthogonal four-bit spreading codes, the fourth level comprises eight branches with mutually orthogonal eight-bit spreading codes, the fifth level comprises sixteen branches with mutually orthogonal sixteen-bit spreading codes, the sixth level comprises thirty two branches with mutually orthogonal thirty-two-bit spreading codes, the seventh level comprises sixty four branches with mutually orthogonal sixty-four-bit spreading codes, the eight level comprises one hundred and twenty eight branches with mutually orthogonal 128-bit spreading codes, the ninth level comprises two hundred and fifty six branches with mutually orthogonal 256-bit spreading codes.

5. A method as claimed in claim 4, **characterized** in that a part of the spreading codes of the code tree are reserved for the use of the control channels.

6. A method as claimed in claim 4, **characterized** in that the code tree is divided into sub-code trees and one branch in a level is a tree access point to a sub-code tree, and the branches below the tree access point belong to the sub-code tree in question.

7. A method as claimed in claim 6, **characterized** in that the data transmission rate of the traffic channel is changed by changing the length of its spreading code, i.e. by moving between the levels of the sub-code tree.

8. A method as claimed in claim 7, **characterized** in that each spreading code of a sub-code tree is numbered in an agreed manner and the number in question is entered into the transport format indicator.

9. A method as claimed in claim 8, **characterized** in that the number refers to at least two parallel spreading codes.

10. A method as claimed in claim 7, **characterized** in that the user equipment does not send an acknowledgement to the radio network subsystem after receiving the transport format indicator.

11. A method as claimed in claim 1, **characterized** in that signalling of the physical layer, data link layer and network layer are transmitted in the control channel.

12. A method as claimed in claim 6, **characterized** in that the radio network subsystem signals the tree access point of the sub-code tree to the user equipment and the user equipment sends an acknowledgement to the radio network subsystem.

13. A method as claimed in claim 12, **characterized** in that the signalling of the tree access point of the sub-code tree is performed as signalling of the MAC sub-layer in the data link layer.

14. A method as claimed in claim 6, **characterized** in that at least two different units of user equipment use the various spreading codes of the same sub-code tree.

15. A method as claimed in claim 14, **characterized** in that the radio network subsystem allocates the spreading codes.

16. A method as claimed in claim 15, **characterized** in that when the sub-code tree becomes congested, the user equipment can be transferred to another sub-code tree.

17. A method as claimed in claim 1, **characterized** in that the radio network subsystem transmits the traffic channel frames in a synchronized manner to the units of user equipment which belong to the same sub-code tree.

18. A method as claimed in claim 1, **characterized** in that the data transmission rate of the control channel is as low as possible.

19. A method as claimed in claim 1, **characterized** in that the control channel contains pilot bits for channel estimation.

20. A method as claimed in claim 1, **characterized** in that the traffic channel contains only useful load of the user.

21. A method as claimed in claim 1, **characterized** in that the radio network subsystem transmits the control channel frames of different user equipment as non-simultaneously as possible.

22. A method as claimed in claim 1, **characterized** in that other than control data, for instance data or speech, is transmitted in the free capacity of the control channel frame.

23. A method as claimed in claim 1, **characterized** in that the same spreading code is always used in spreading the control channel.

24. A method as claimed in claim 1, **characterized** in that the data transmission rate of the control channel is fixed.

25. A method as claimed in claim 1, **characterized** in that the method is used in a universal mobile telecommunication system using a direct-sequence wideband code division multiple access method.

26. A radio network subsystem (RNS) which is adapted to:

- transmit a dedicated control channel to user equipment (UE);
- transmit a dedicated traffic channel of variable data transmission rate to user equipment (UE);
- spread each channel with a spreading code during transmission;
- change the spreading code used to spread the traffic channel according to the required data transmission rate;

characterized in that the radio network subsystem is adapted to indicate in each control channel frame the spreading code with which the corresponding traffic channel frame is spread when transmitted.

27. A radio network subsystem as claimed in claim 26, **characterized** in that the radio network subsystem is adapted to transmit the control channel and traffic channel frames associated with each other on the same frequency, spread with different spreading codes, and substantially simultaneously, i.e. separated by one frame length at most.

28. A radio network subsystem as claimed in claim 26, **characterized** in that the control channel frame comprises a transport format indicator into which the radio network subsystem is adapted to enter the identification data of the spreading code used to spread the traffic channel.

29. A radio network subsystem as claimed in claim 26, **characterized** in that the spreading codes are arranged into a code tree in such a manner that on the first level, the code tree root comprises a one-bit spreading code, the second level comprises two branches with mutually orthogonal two-bit spreading codes, the third level comprises four branches with mutually orthogonal four-bit spreading codes, the fourth level comprises eight branches with mutually orthogonal eight-bit spreading codes, the fifth level comprises sixteen branches with mutually orthogonal sixteen-bit spreading codes, the sixth level comprises thirty two branches with mutually orthogonal thirty-two-bit spreading codes, the seventh level comprises sixty four branches with mutually orthogonal sixty-four-bit spreading codes, the eight level comprises one hundred and twenty eight branches with mutually orthogonal 128-bit spreading codes, the ninth level comprises two hundred and fifty six branches with mutually orthogonal 256-bit spreading codes.

30. A radio network subsystem as claimed in claim 29, **characterized** in that the radio network subsystem is adapted to reserve a part of the spreading codes in the code tree for the use of the control channels.

31. A radio network subsystem as claimed in claim 29, **characterized** in that the radio network subsystem is adapted to divide the code tree into sub-code trees, and one branch in a level is a tree access point to a sub-code tree, and the branches below the tree access point belong to the sub-code tree in question.

32. A radio network subsystem as claimed in claim 31, **characterized** in that the radio network subsystem is adapted to change the data transmission rate of the traffic channel by changing the length of its spreading code, i.e. by moving between the levels of the sub-code tree.

33. A radio network subsystem as claimed in claim 32, **characterized** in that the radio network subsystem is adapted to number each spreading code of a sub-code tree in an agreed manner and to enter the number in question into the transport format indicator.

34. A radio network subsystem as claimed in claim 33, **characterized** in that the number refers to at least two parallel spreading codes.

35. A radio network subsystem as claimed in claim 32, **characterized** in that the radio network subsystem does not expect an acknowledgement from the user equipment after transmitting the transport format indicator to the user equipment.

36. A radio network subsystem as claimed in claim 26, **characterized** in that the radio network subsystem is adapted to transmit signalling of the physical layer, data link layer and network layer in the control channel.

37. A radio network subsystem as claimed in claim 31, **characterized** in that the radio network subsystem is adapted to signal the tree access point of the sub-code tree to the user equipment and to await an acknowledgement to its signalling from the user equipment.

38. A radio network subsystem as claimed in claim 37, **characterized** in that the radio network subsystem is adapted to perform the signalling of the tree access point of the sub-code tree as signalling of the MAC sub-layer in the data link layer.

39. A radio network subsystem as claimed in claim 31, **characterized** in that the radio network subsystem is adapted to use the various spreading codes of the same sub-code tree for at least two different units of user equipment.

40. A radio network subsystem as claimed in claim 39, **characterized** in that the radio network subsystem is adapted to allocate the spreading codes.

41. A radio network subsystem as claimed in claim 40, **characterized** in that when the sub-code tree becomes congested, the radio network subsystem is adapted to transfer the user equipment to another sub-code tree.

42. A radio network subsystem as claimed in claim 26, **characterized** in that the radio network subsystem is adapted to

transmit the traffic channel frames in a synchronized manner to the units of user equipment which belong to the same sub-code tree.

43. A radio network subsystem as claimed in claim 26, **characterized** in that the radio network subsystem is adapted to set the data transmission rate of the control channel as low as possible.

44. A radio network subsystem as claimed in claim 26, **characterized** in that the radio network subsystem is adapted to place pilot bits into the traffic channel for channel estimation.

45. A radio network subsystem as claimed in claim 26, **characterized** in that the radio network subsystem is adapted to place only useful load in the traffic channel.

46. A radio network subsystem as claimed in claim 26, **characterized** in that the radio network subsystem is adapted to transmit the control channel frames of different user equipment as non-simultaneously as possible.

47. A radio network subsystem as claimed in claim 26, **characterized** in that the radio network subsystem is adapted to place other than control data, for instance data or speech, in the free capacity of the control channel frame.

48. A radio network subsystem as claimed in claim 26, **characterized** in that the radio network subsystem is adapted to always use the same spreading code in spreading the control channel.

49. A radio network subsystem as claimed in claim 26, **characterized** in that the radio network subsystem is adapted to transmit the control channel at a fixed data transmission rate.

50. A radio network subsystem as claimed in claim 26, **characterized** in that the radio network subsystem is a part of a universal mobile telecommunication system using a direct-sequence wideband code division multiple access method.

51. User equipment (UE) which is adapted to:

- receive a dedicated control channel transmitted by the radio network subsystem (RNS);
- receive a dedicated traffic channel of variable data transmission rate transmitted by the radio network subsystem (RNS);
- remove the spreading of each channel with a spreading code,

characterized in that the user equipment is adapted to read from each control channel frame the spreading code with which the corresponding traffic channel frame is spread.

52. User equipment as claimed in claim 51, **characterized** in that the user equipment is adapted to receive the control channel frames and traffic channel frames associated with each other transmitted by the radio network subsystem on the same frequency, spread with different spreading codes, and substantially simultaneously, i.e. separated by one frame length at most.

53. User equipment as claimed in claim 51, chat in that the control channel frame comprises a transport format indicator from which the user equipment is adapted to read the identification data of at least one spreading code used to spread the traffic channel.

54. User equipment as claimed in claim 51, **characterized** in that the user equipment is adapted to perform channel estimation by means of the pilot bits in the control channel.

55. User equipment as claimed in claim 51, **characterized** in that the user equipment is adapted to always use the same spreading code in removing the control channel spreading.

56. User equipment as claimed in claim 51, **characterized** in that the user equipment is used in a universal mobile telecommunication system using a direct-sequence wideband code division multiple access method.